

From: [PETERSON Jenn L](#)
To: [Burt Shephard/R10/USEPA/US@EPA](#); [ANDERSON Jim M](#); [Eric Blischke/R10/USEPA/US@EPA](#)
Subject: EPA's Initial Comment Review
Date: 12/21/2009 02:45 PM
Attachments: [DioxinFuranDistribRI_Report_2.xlsx](#)

Hi Burt and Eric,

Here is an expansion on my issues for the initial comment letter. Please let me know if you would like to discuss.

Jennifer

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Dioxin / Furans:

Here is a more focused list of my concerns in the handling of dioxin / furan risk in the BERA for Portland Harbor. I think these comments are important enough that they should be included in the initial comments to the LWG. I tried, but was unable to discuss with Burt before sending out these comments. I will be out until the 29th, but can be available by phone if discussion is needed. I am including a table that lists concentrations in surface water and sediment for a few representative dioxins and furans as well as total PCDD / PCDF.

There are three objectives to examining dioxin and furan concentration in the risk assessment. I will focus my comments on these three areas.

Dioxin-like toxicity associated with AHR (aryl hydrocarbon receptor). This type of toxicity has been shown in organisms that possess the AHR such as mammals, birds and fish.

- a. Fish: Tissue residue data, surface water and sediment concentrations. Dioxins and furan concentrations using the TEF approach should be used to evaluate effects to fish using tissue concentrations (tissue residue), and surface water (direct exposure) and sediment concentrations converted to dose using TEF methodology (fish dietary).
 - i. Surface Water: Only 2,3,7,8-TCDD was evaluated and screened out using a 2,3,7,8-TCDD TRV of 0.0001 pg/L. Burt has already commented that this value should be 0.00001 ug/L, but looking solely at 2,3,7,8-TCDD does not address the other dioxin like congeners present in surface water.
 - ii. Fish Dietary Approach: The LWG looked at fish dietary models, but did not evaluate sediment in terms of representing a total dioxin TEQ to fish. I doubt there is a fish dietary TRV available, but certainly sediment could be presented and screened as a TEQ as one line of evidence. Sediment TEQs are presented in

the RI report.

- iii. Tissue Residue: The tissue residue dioxin TEQs were addressed in the risk assessment, but the TRV used to screen out fish effects should be re-visited using species sensitivity methodology EPA used for other chemicals. Efforts by others have shown appropriate fish TRVs are on the order of 6.5 pg/g (DEQ, 2007), and Stephens, Dyer and Shephard, all lower than the LWG number of 90 pg/g (Windward 2005). The bottom line for me is that we should be using a defensible TRV protective of fish. Tissue residue concentrations from Round 3 (max 78 pg/g) show tissue residue values higher than peer reviewed literature toxicity reference values. This is important for identifying localized effects on fish species, as all exceedances occur in the ARKEMA / Rhone Poulenc section of the river.
- b. Wildlife: Dioxin and furan concentrations in prey should be converted to a dioxin TEQ using bird and mammal TEFs. This was completed in the risk assessment, as "dioxin TEQ" is carried through as a COPC. However, the congeners driving dioxin TEQ risk are not discussed. Congener contribution to fish tissue dioxin TEQ for birds and mammals is only shown in the documents "*Early Preliminary Remediation Goals*", Attachment 1, TEQ Surrogates for PRG Development, March 27, 2009 and the "*Bioaccumulation Modeling Report*", Appendix A, TEQ Surrogate Selection, July 21, 2009. These relationships should be discussed in the risk assessment, as connections and agreement between dioxin TEQ risk and the congeners driving the risk are important for the RI, risk assessment and PRG development.

Non-dioxin like toxicity: Some organisms do not possess AHR, such as invertebrates, or there is uncertainty in the role species specific binding proteins play in mediating toxicity as in amphibians, reptiles, and some fish (e.g. hagfish) indicating that toxicity equivalent methodology should not be applied to assess risk. However as EPA 2008 states (*Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment*), invertebrates may be vulnerable to these chemicals via other non-dioxin like toxicological effects. It is notable, for example, that PCBs measured as Aroclors have been shown to be chronically toxic to daphnids at low ppb levels (Maki and Johnson, 1975; Nebeker and Puglisi, 1974 in EPA 2008).

- a. Surface Water: Direct effects of dioxins and furans should be assessed for aquatic life. The BERA only looks at 2,3,7,8-TCDD, and screens out all other congeners due to "no SLV". The LWG actually calculates dioxin/furan TEQs, Total TEQs, and PCB TEQs for water in Tables D3: 2-3 through D3: 2-6 (Summary statistics for water

analytes). Although not clear in the document, I think they are calculating fish TEQs. Due to the nature of some of the releases in Portland Harbor, some of these other congeners are present at high concentrations as compared to TCDD, and should be evaluated for direct effects. I would recommend using the EPA AWQC of 0.00001 ug/L to evaluate the additional congeners by both calculating a total dioxin and furan concentration, and comparing each congener individually to the AWQC. Toxicity information is present in the document (e.g. see Table 2), and it is reasonable to assume toxicity would be similar between congeners in species that lack the AH receptor. If there are concerns that this AWQC includes effects on human health (e.g. marketability of fish), a recalculation or selection of another appropriate value should be completed. As the BERA screening stands now, there is no way for the reader to assess environmental concentrations of dioxins and furans beyond 2,3,7,8-TCDD.

- b. Sediment: As is the case with surface water, sediment individual and total dioxin and furan concentrations should be screened for direct effects. These concentrations are available in the RI.
- c. Invertebrate Tissue Residue: A tissue residue value of 767 pg/g for protection of invertebrates was used in the BERA. This value should be reviewed to ensure the body of adverse effects is captured in this analysis. However, only 2,3,7,8-TCDD was evaluated in invertebrate tissue residue. A footnote in Table 3-1, Appendix G of the BERA indicates "2,3,7,8-TCDD was evaluated as a representative for all dioxins and furans", meaning only 2,3,7,8-TCDD concentrations were evaluated against the TRV. The maximum concentration of 2,3,7,8-TCDD alone was 493 pg/g, but the more relevant value would be a total dioxin furan invertebrate concentration compared to an appropriate dioxin / furan TRV. For example, the maximum lab-exposed worm tissue residue was 6,440 pg/g.

Food Web Modeling: This effort is geared toward modeling and predicting the tissue residues of dioxins and furans in various biological tissues such as fish and bird egg tissue, as well as dietary models of effects for birds and mammals. The modeling should focus on congeners of concern in fish, birds. The only congener selected to represent dioxin TEQ was 2,3,4,7,8-PeCDF. My initial comments outlined some additional congeners that should be evaluated based on their contribution to dioxin TEQ and Total TEQ. These comments speak to the analysis done in the *Early Preliminary Remediation Goals*, Attachment 1, March 27, 2009 and the *Bioaccumulation Modeling Report*, Appendix A, July 2009. For birds, this should clearly include an evaluation of 2,3,7,8-TCDF. This congener by far shows the highest contribution to dioxin TEQ for birds in water, sediment, clam, crayfish,

sculpin, carp and smallmouth bass (Table 5 in LWG 2009). A PRG for this congener should be calculated to ensure protectiveness of birds.

Issues other than dioxins:

Other issues on the BERA that I didn't see in the comments:

Refined Screen: There is a flowchart included in the text, but it is unclear how this was ultimately used to refine contaminants of concern. More information from the LWG is needed.

Bird Egg: It would be good to emphasize they need to put this line of evidence back in.

Missing Documentation – Calculation of EPCs. I think it is a big deal that we do not have documentation in the calculation of EPCs, which is an important part of the risk assessment. It would be good to ask for this information now so we can continue our review.

Thanks and MERRY CHRISTMAS!

Jennifer

From: Shephard.Burt@epamail.epa.gov [mailto:Shephard.Burt@epamail.epa.gov]
Sent: Wednesday, December 16, 2009 10:07 AM
To: PETERSON Jenn L; ANDERSON Jim M
Cc: Blischke.Eric@epamail.epa.gov
Subject: EPA discussions on Jennifer's comments

Attached is an earlier version of the initial risk assessment comments Eric sent out the afternoon of December 15, 2009. Towards the end of the attached draft are some of Jennifer's comments with my initial responses. I didn't write up responses to all comments at the time, and you'll see some differences between what I wrote earlier and what ended up in what Eric sent out. So the attached should be considered a working or preliminary draft. Should give you some sense of my thinking at the time.

Best regards,

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"If your experiment needs statistics to analyze the results, then you ought to have done a better experiment"

- Ernest Rutherford